

# High Yield, High Efficiency Epitaxial Lift-Off Solar Cells for LILT Applications, Phase I

Completed Technology Project (2018 - 2019)



## Project Introduction

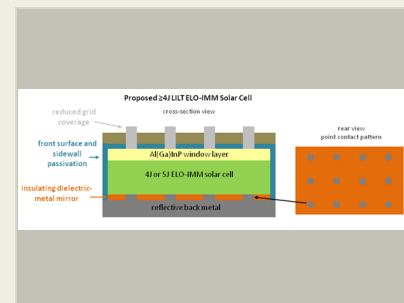
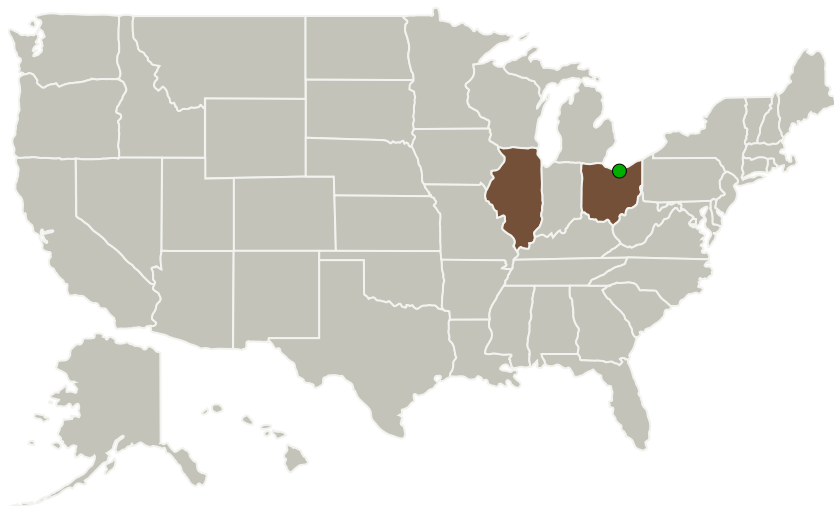
As the world leader in the production of epitaxial lift-off (ELO) inverted metamorphic (IMM) solar cells, MicroLink Devices proposes to develop large-area ELO-IMM solar cell designed specifically for low intensity, low temperature (LILT) space applications. These solar cells will achieve 45% power conversion efficiency (at  $-125^{\circ}\text{C}$  and 5.2 AU) with high production yields, enabling substantial solar array costs for future NASA outer planetary space missions.

## Anticipated Benefits

The proposed LILT ELO-IMM solar cells will benefit future NASA missions to the outer solar system where solar cells will operate under LILT conditions. These solar cells will enable substantial solar array cost reductions making them especially suitable for large-scale SEP (solar electric propulsion) spacecrafts operating in LILT conditions.

Manufacturers of commercial satellites and unmanned aerial vehicles (UAVs) are interested in MicroLink's low mass and power dense ELO solar cell technology for the potential to reduce costs while improving the efficiency compared to commercially available Ge-based cells. Attractive military and civilian applications include the ability to recharge batteries in remote locations.

## Primary U.S. Work Locations and Key Partners



High Yield, High Efficiency Epitaxial Lift-Off Solar Cells for LILT Applications, Phase I

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Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

Illinois	Ohio
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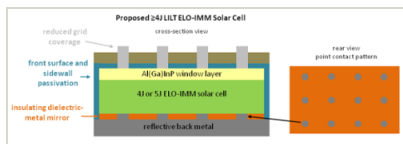
## Project Transitions

**July 2018:** Project Start**February 2019:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141366>)

## Images



### Briefing Chart Image

High Yield, High Efficiency Epitaxial Lift-Off Solar Cells for LILT Applications, Phase I  
(<https://techport.nasa.gov/image/126790>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

MicroLink Devices, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

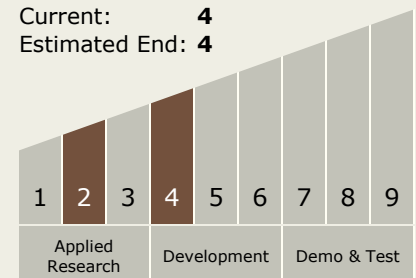
Carlos Torrez

### Principal Investigator:

Drew Cardwell

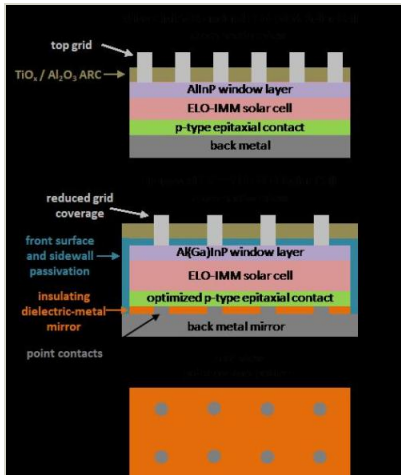
## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



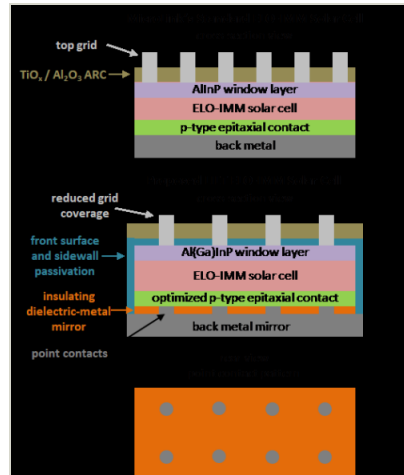
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## Final Summary Chart Image

High Yield, High Efficiency Epitaxial Lift-Off Solar Cells for LILT Applications, Phase I  
(<https://techport.nasa.gov/image/135477>)



## Final Summary Chart Image

High Yield, High Efficiency Epitaxial Lift-Off Solar Cells for LILT Applications, Phase I  
(<https://techport.nasa.gov/image/125830>)

## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.1 Power Generation and Energy Conversion
    - └ TX03.1.1 Photovoltaic

## Target Destination

Others Inside the Solar System